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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/870,242	05/30/2001	Jitendra Singh Goela	51048-2 DIV (3568-33-000)	9573
21874	7590	07/29/2004	EXAMINER	
EDWARDS & ANGELL, LLP P.O. BOX 55874 BOSTON, MA 02205			EGAN, BRIAN P	
			ART UNIT	PAPER NUMBER

1772

DATE MAILED: 07/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 09/870,242	Applicant(s) GOELA ET AL.1	
	Examiner Brian P. Egan	Art Unit 1772	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 May 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 27-30 and 32-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 27-30 and 32-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                                                        |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 27-29 and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suda et al. (#5,783,255).

Suda et al. teach a hollow chemical vapor deposited monolithic silicon carbide (see Abstract; Col. 3, lines 55-67) shell having an aspect ratio of 150 (Col. 6, lines 33-35). The CVD silicon carbide shell can be both cylindrical (Col. 6, lines 33-55) and frustroconical ("dome-shaped" – Col. 5, lines 22-25). Suda's chemical vapor deposition process involves forming a silicon carbide film layer on a surface of a carbon substrate by CVD and removing the carbon substrate (Col. 2, lines 16-18). Suda selects a carbon substrate with a specific amount of graphite to control the thermal expansion coefficient of the substrate such that cracks are not formed in the silicon carbide shell upon removal of the substrate (Col. 3, lines 13-30). The shaped article obtained is free from the generation of strain at a boundary between the SiC shell and the underlying substrate during the cooling process subsequent to the CVD treatment and has a dense and smooth surface (Col. 4, lines 42-45). The carbon substrate is easily removable from the resultant shaped article by an oxidization treatment known in the art (Col. 4, lines 45-48). No post treating of cutting and/or polishing is required (Col. 3, lines 50-54).

Although Suda et al. teach an example of a cylindrical SiC shell with a diameter of 150mm (which correlates to an external perimeter of 18.5 inches), Suda et al. fail to explicitly teach that the external perimeter of the article can be increased to exceed 65 inches and that the aspect ratio can exceed 200. Such modifications, however, would have involved a mere change in size. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955). Despite the Applicant's contentions that prior art SiC shells could not be made at large diameters since cracking occurs, Suda et al. explicitly teach the use of a carbon composite substrate that the SiC shell is formed upon using CVD wherein the carbon composite is specifically formed to exhibit a thermal expansion equivalent to that of the desired end product formed upon the composite to prevent cracking and deformation (Col. 4, lines 15-23). Therefore, it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to have formed a SiC shell with a perimeter in excess of 65 inches and an aspect ratio of 200 or greater by forming the carbon composite such that it exhibits a thermal expansion equivalent to a SiC shell with a perimeter in excess of 65 inches with an aspect ratio of 200 or greater.

3. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suda et al. ('255) in view of Sibley (#5,776,391).

Suda et al. teach a silicon carbide shell as detailed above. Although Suda et al. teaches a dense silicon carbide (Col. 4, line 1-5), Suda et al. fail to explicitly state that the density is at least 3.15 grams per cubic centimeter.

Sibley, however, teaches the use of full density silicon carbide shells. Sibley teaches a silicone carbide density of at least 3.18 grams per cubic centimeter (Col. 8, lines 1-2). Sibley

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teaches the use of a full density silicon carbide for the purpose of providing an advantageous structure where high temperatures and/or corrosive chemicals are present wherein the structure provides high dimensional stability as well as prevents contaminating elements from affecting the process (see Abstract). It would have been obvious through routine experimentation to one of ordinary skill in the art at the time applicants invention was made to have provided a full density silicone carbide material for the purpose of providing an advantageous structure where high temperatures and/or corrosive chemicals are present wherein the structure provides high dimensional stability as well as prevents contaminating elements from affecting the process as taught by Sibley.

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicants invention was made to have modified Suda et al. to include full density silicon carbide in the silicone carbide shell as taught by Sibley in order to provide an advantageous structure where high temperatures and/or corrosive chemicals are present wherein the structure provides high dimensional stability as well as prevents contaminating elements from affecting the process.

#### ***Response to Arguments***

4. The applicant's arguments with respect to the 35 U.S.C. 103(a) rejection of claims 27-34 over Reagan et al. ('862) in view of Sibley ('649) and Caputo et al. ('108) from the previous office action are deemed persuasive by the examiner. Therefore, the examiner has withdrawn the aforementioned rejection.

5. With regards to the applicant's contention that the examiner must give weight to the limitation "chemical vapor deposited," the applicant's arguments are deemed persuasive. In

accordance with In re Garnero, the manufacturing process step of chemical vapor deposition is deemed to impart distinctive structural characteristics to the final product.

6. With regards to the applicant's contentions concerning the 35 U.S.C. 102(b) and 103(a) rejections over Suda et al. ('255) (as well as Suda et al. in combination with Sibley ('391) from the previous office action, the applicant's arguments are not deemed persuasive.

The primary issue of contention is that Suda et al. fail to teach a CVD SiC shell with an external perimeter in excess of 50 inches. The examiner agrees with the applicant's that Suda et al. only disclose embodiments comprising either a shell with a 150mm diameter (which corresponds to an external perimeter of roughly 18 inches) or a dome-shaped article with a diameter of 50mm. It is noted that the term "shell" must be broadly interpreted by the examiner -- therefore, both dome-shaped and disc-shaped articles fall within a broad interpretation of "shell." Despite Suda et al.'s failure to teach a shell within the applicant's claimed perimeter range, the examiner maintains that it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to have increased the size of the shell in Suda et al. such that it falls within the applicant's claimed perimeter and aspect ratio range. The examiner agrees with the applicant that SiC production does not necessarily scale linearly. Regardless, based on the processes disclosed by Suda et al., one of ordinary skill in the art at the time applicant's invention was made would have had a reasonable expectation of success in creating a shell with a perimeter in excess of 65 inches since Suda et al. explicitly discloses process steps to prevent cracking of the shell during or after the CVD process. Suda et al. not only explicitly state that post treatment via cutting and/or polishing is not required, but that the SiC shell is easily removable from the resultant shaped article by an oxidization treatment generally used in

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the prior art (see Col. 3, lines 50-54 and Col. 4, lines 44-47). Therefore, Suda et al. solve for the very same problems that the applicant does, i.e., preventing cracks of SiC shells during and after chemical vapor deposition. Given that the United States Patent and Trademark Office do not have their own testing facilities, the burden is upon the applicant to provide evidence that the prior art products of Suda et al. do not necessarily possess the characteristics of the claimed product. See In re Best, 562 F.2d 1252, 1255 (CCPA 1977). With regards to motivation in Suda et al. to create larger perimeter shells, there is no requirement that a motivation be expressly articulated. One of ordinary skill in the art at the time applicant's invention was made would understand the benefits of SiC shells with increased diameter. Just as a pipe with increased diameter has a larger amount of uses since different products can be processed through the pipe, the same holds true for shells with larger perimeters.

As a final note, as the applicant's invention is focused on silicon carbide shells that are free of cracks, the examiner strongly suggests that the applicant insert the claim language "free of cracks," i.e., "A hollow chemical vapor deposited monolithic silicon carbide shell that is free of cracks..." into claim 27. Otherwise, the applicant's own admission that it is known to produce large scale SiC shells with cracks would seemingly read on the claimed invention. Furthermore, the examiner requests that the applicant define the aspect ratio within a specific range, i.e., an aspect ratio of 50 to 200. The limitation "50 or greater" is inclusive of infinite amounts of aspect ratios. It cannot be said based on the applicant's disclosure that the applicant's have possession of embodiments having aspect ratios above 200. Although values such as 200 are reasonable, the same does not hold true for values such as 1,000, 100,000 or 1,000,000 and greater.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian P. Egan whose telephone number is 571-272-1491. The examiner can normally be reached on M-F, 8:30-5.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Y. Pyon can be reached on 571-272-1498. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
BPE 7/21/04

  
HAROLD PYON  
SUPERVISORY PATENT EXAMINER 7/23/04  
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